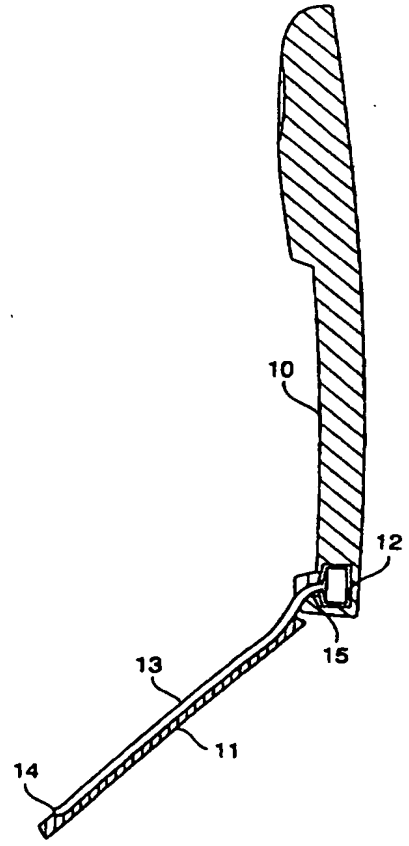


PCTWORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : H04M 1/02	A1	(11) International Publication Number: WO 97/42746 (43) International Publication Date: 13 November 1997 (13.11.97)
(21) International Application Number: PCT/SE97/00623 (22) International Filing Date: 14 April 1997 (14.04.97) (30) Priority Data: 9601701-7 3 May 1996 (03.05.96) SE (71) Applicant: TELEFONAKTIEBOLAGET LM ERICSSON (publ) [SE/SE]; S-126 25 Stockholm (SE). (72) Inventor: PERSSON, Per-Håkan; Lilla Harrie PL 2170, S-244 91 Kävlinge (SE). (74) Agent: TELEFONAKTIEBOLAGET LM ERICSSON; Patent and Trademark Dept., S-126 25 Stockholm (SE).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>
(54) Title: SOUND GUIDE FOR SPEECH COMMUNICATORS (57) Abstract <p>Within the technical area of wireless telephony, development is towards smaller and smaller telephones. Since they are now so small that they do not reach from the ear all the way to the mouth of the speaker, a flip-cover (11) must be used to "collect" the sound. The invention describes a sound guide (13) in the form of a hollow soft flexible tube which extends from the flip-cover into the body (10) of the telephone and collects the speech. The sound guide is manufactured in one piece and is flexible in order to be able to be folded (16) when the flip-cover is closed. It can be disposed both on top of the flip-cover as well as inside it.</p> 		

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon		Republic of Korea	PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakhstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

SOUND GUIDE FOR SPEECH COMMUNICATORS

TECHNICAL FIELD

5 The invention relates to an improvement in the sound take-up in a portable telephone/speech communicator, such as a mobile telephone, a cordless telephone or a walkie-talkie etc, with the aid of an air/sound guide which, applied to the telephone, guides the speech to the microphone.

10

THE STATE OF THE ART

Portable speech communicators, such as mobile telephones, often have the microphone placed inside the body of the
15 telephone and in that end closest to the mouth to obtain the best possible sound take-up. By placing the microphone close to the mouth, the ratio of direct sound from the speaker to the noise contributed by the surroundings is large, thus providing a high signal/noise ratio (SNR). Since we are
20 progressing towards smaller and smaller mobile telephones, this means that the telephones are starting to become so small that they hardly "reach" the mouth if held in conversation position, i.e. pressed to the ear..

25 EP 0 275 996 discloses a telephone with a so-called semi-active flip-cover, which can be swung out from the body of the telephone for conversation. This flip-cover is used to guide, via a sound inlet therein, sound from the mouth into the microphone located inside the body of the telephone. The
30 sound inlet consists of a slot in the flip-cover and an ear channel leading to the body of the telephone with its micro-

phone, which is disposed in the "speaking end" of the telephone body, i.e. the end connected to the flip-cover. It is, however, difficult in design with flip-covers to insulate the sound guide from "useless" sound, i.e. surrounding noise and disturbances, actually all sound which is not the user's speech. In another known concept, with a so-called active flip-cover, the microphone is placed in the end of the cover. In this case, it is relatively unprotected and it is also difficult to make a reliable electrical contact between the flip-cover and the body of the telephone. It is also difficult to protect the microphone and the contact junction against radio frequency interference, since the wires which must be laid from the microphone into the tele-phone body will function as antennas. Another disadvantage of having a micro-phone in the flip-cover is that it is more expensive to manufacture than if the flip-cover is only used as a simple sound guide inside the body of the telephone.

20 DESCRIPTION OF THE INVENTION

Portable speech communicators thus have a problem caused by the market demand for units which are as small as possible. The communicator, usually a telephone, is quite simply too short for the speaking end to come sufficiently close to the mouth to provide good sound quality. Too much of the surrounding noise is taken up together with the speech. By placing on the telephone body a cover which can be flipped out from the speaking end, a greater proportion of the speech can be collected, a so-called passive flip-cover. In order to additionally improve the sound quality, an ear

passage/tunnel can be arranged on the flip-cover or within the same up to the microphone, which is most often placed within the body of the telephone since it must be protected against physical harm and in order to shield it from interference, a so-called semi-active flip-cover. An alternative is the active cover where the microphone is placed at the distal end of the flip-cover to place it close to the mouth. This makes the design more complicated and thus more expensive, i.e. an additional disadvantage to be added to the greater sensitivity to disturbances and the physical vulnerability.

The invention is therefore intended to solve the problems which arise with the semi-active flip-cover, i.e. when there is an ear channel/sound guide from the cover up to a microphone placed in the body of the telephone. The problem with such a design is finding a good method of insulating the sound guide from all sounds which are not speech. At the hinge for the flip-cover, it is difficult to achieve a good seal, which is very important since no surrounding noise should be allowed to leak into the microphone. With an air guide according to the prior art (see EP 0 275 996) there will be problems since the sound guide is rigid and must therefore be section-ed to be able to be folded when the flip-cover is folded in. At the junction between the sections there must be some form of seal so that no "useless" noise will come in or "useful" speech leak out. In order to achieve this, a complicated design is required but it is still difficult to prevent all leakage. The prior art reveals a design with sealing material at the pivot axis of the flip-cover. A sound guide which is divided into rigid

segments also has sharp angles, in this case the angle between the flip-cover and the telephone. This results in a weakening of the sound pressure which eventually reaches the microphone. The design will also suffer from wear since the
5 flip-cover is opened and closed many times during the life of the tele-phone. This is particularly serious for the seal required in the junction between the flip-cover and the body of the telephone.

10 The invention solves these problems in a simple and inexpensive manner from the point of view of production costs by using a flexible sound-tight tube in a single piece without any moving parts or sharp edges.

15 When the telephone is in the conversation position, i.e. with the flip-cover out, the sound guide, which can be fixed to the flip-cover or be mounted inside the same, guides sound from the opening/sound inlet at the end of the cover to the microphone which is placed inside the body of the
20 telephone. When the telephone is not in the conversation position, the flip-cover is folded in against the body of the telephone and the sound guide is folded up.

The invention makes it suitable to manufacture a telephone
25 with a semi-active flip-cover at a lower cost than a telephone with an active flip-cover (the microphone in the flip-cover). The cost will also be lower than for the traditional model with a semi-active flip-cover since fewer parts are needed. The flip-cover can be made with a simpler
30 shape, and satisfactory speech quality is obtained without having to take a number of quality increasing steps. The

absence of sharp angles in the sound guide provides better acoustic properties. By virtue of the fact that the sound guide is made as a single component molded in one piece, there will be no joints where noise can leak in or speech
5 leak out.

DESCRIPTION OF THE FIGURES

One embodiment of the invention will be described below with
10 reference to the accompanying drawings of which:

- Figure 1 shows a side view of the speaking end of a prior art portable telephone with the flip-cover folded out,
- Figure 2 shows a side view of a portable telephone according to the invention with the flip-cover folded out,
15 and
- Figure 3 shows the same telephone with the flip-cover folded in.

PREFERRED EMBODIMENT

20

In this preferred embodiment there will be described, with reference to the Figures, how a sound guide can be applied to a speech communicator in a simple manner.

25 Figure 1 shows the speaking end 1 of a cordless telephone with the flip-cover 2 in the folded out position and a sound guide 3 of known design. It can be seen that the sound guide, which in this case is located inside the flip-cover, is a rigid and segmented air passage. At the pivot axis of
30 the flip-cover the sound guide is there-fore divided and

sealing material 4 must thus be used at the junction to prevent noise from leaking into the microphone 5.

Figure 2 shows in accordance with the invention a cordless
5 telephone 10 of modern type, which can be a mobile telephone
with radio communication to outdoor local base stations
which in turn are coupled to mobile exchanges, or e.g. a
DECT- telephone for indoor use in a company with radio
communication to small local base stations on the company
10 premises, for example, said base stations in turn being
coupled to a PBX. Conceivably it can also be a cordless
telephone for private use of the type which is relatively
common in private homes, or a walkie talkie. All these types
of speech communicators are being made smaller and smaller.
15 In order to improve the sound quality, a flip-cover 11, as
shown in the Figure, is used to collect the speech and guide
it to the microphone 12. According to the invention, a soft
narrow plastic hose 13 is applied onto the flip-cover. The
plastic hose functions as a sound guide and collects the
20 speech from the mouth of the telephone user. The sound guide
13 lying on top of the flip-cover 11 can be glued to the
same or fixed in some other manner; e.g. the flip-cover
which is preferably of hard plastic, can be molded with some
form of eye which the sound guide can be slipped through.
25 Another conceivable embodiment would be to press the plastic
hose into a suitable groove which can run, for example,
along the edge of the flip-cover to a microphone placed in
the body of the telephone. In an additional embodiment, the
sound guide can be placed inside the flip-cover,
30 presupposing that the flip-cover is molded with a hollow

passage for the sound guide, which in this case would be well protected against external damage.

The sound guide is of course hollow and has an opening 14 in its end closest to the mouth of the speaker. The sound waves generated by the speech, which in reality are compressed and expanded areas of the air medium, are propagated via the opening 14 into the sound guide as variations in pressure. The sound guide runs along the flip-cover into the body of the telephone and it is manufactured in one piece so that no other disturbances can leak in, as would be the case if it had been segmented.

Inside the body of the telephone, a microphone 12 is often placed in a small cavity with rubber walls as protection against undesired noise caused by impact against the body of the telephone. The microphone is placed in the speech portion of the tele-phone, i.e. that end to which the flip-cover is joined. By having the microphone in-side the body of the telephone itself instead of in the flip-cover, it is also protected against radio frequency interference.

The sound guide leads from the flip-cover via the pivot axis 15 of the flip-cover and into the cavity in the telephone body where the microphone 12 is placed, without any sharp edges or bends which would impair the sound quality.

Figure 3 shows the telephone with the flip-cover 11 folded in. It shows how the sound guide is bent conformingly 16 at the pivot axis of the flip-cover, since it is preferably made of soft plastic. It is of course also possible to make

the sound guide of some other flexible material such as silicon, rubber, textile or woven material. The primary important feature is in any case that it be made in one piece.

CLAIMS

1. Device for sound take-up in a speech communicator, such as a land mobile radio, a walkie talkie, a mobile telephone or a cordless telephone (10), with a flip-cover (11) which
5 can be folded out from the body of the telephone, **characterized in**
- that a tubular sound guide (13) of arbitrary geometric cross section and size runs from the flip-cover (11) in one piece to the body of the telephone,
 - 10 - that the sound guide is of flexible material,
 - that a microphone is placed in the body of the telephone and in connection with the sound guide.
2. Device for sound take-up in a speech communicator (10)
15 according to claim 1, **characterized** in that the sound guide is applied on the flip-cover (11).
3. Device for sound take-up in a speech communicator (10) according to claim 1, **characterized** in that the sound guide
20 is disposed inside the flip-cover in a cavity therein.
4. Device for sound take-up in a speech communicator (10) according to claim 1, **characterized** in that the sound guide is disposed in a groove along the flip-cover.
- 25
5. Device for sound take-up in a speech communicator (10) according to one of claims 1 - 4, **characterized** in that the sound guide (13) is made of rubber, silicon, soft plastic, airtight textile or woven material, for example.

6. Device for sound take-up in a speech communicator (10) according to one of claims 1 - 5, **characterized** in that the sound guide is folded (16) together in a single piece when the flip-cover is folded in towards the body of the
5 telephone.

7. Method of sound take-up in a speech communicator (10), such as a land mobile radio, a walkie talkie, a mobile telephone or a cordless telephone, where speech is collected
10 by a flip-cover (11) which can be folded out from the body of the telephone, **characterized** in that the air pressure variations caused by the speech are supplied to a sound guide (13) disposed on or in the flip-cover (11), said sound guide conducting via its opening (14), in a single flexible
15 piece, the sound into the body of the telephone where a microphone (12) is placed in conjunction with the sound guide.

1/2

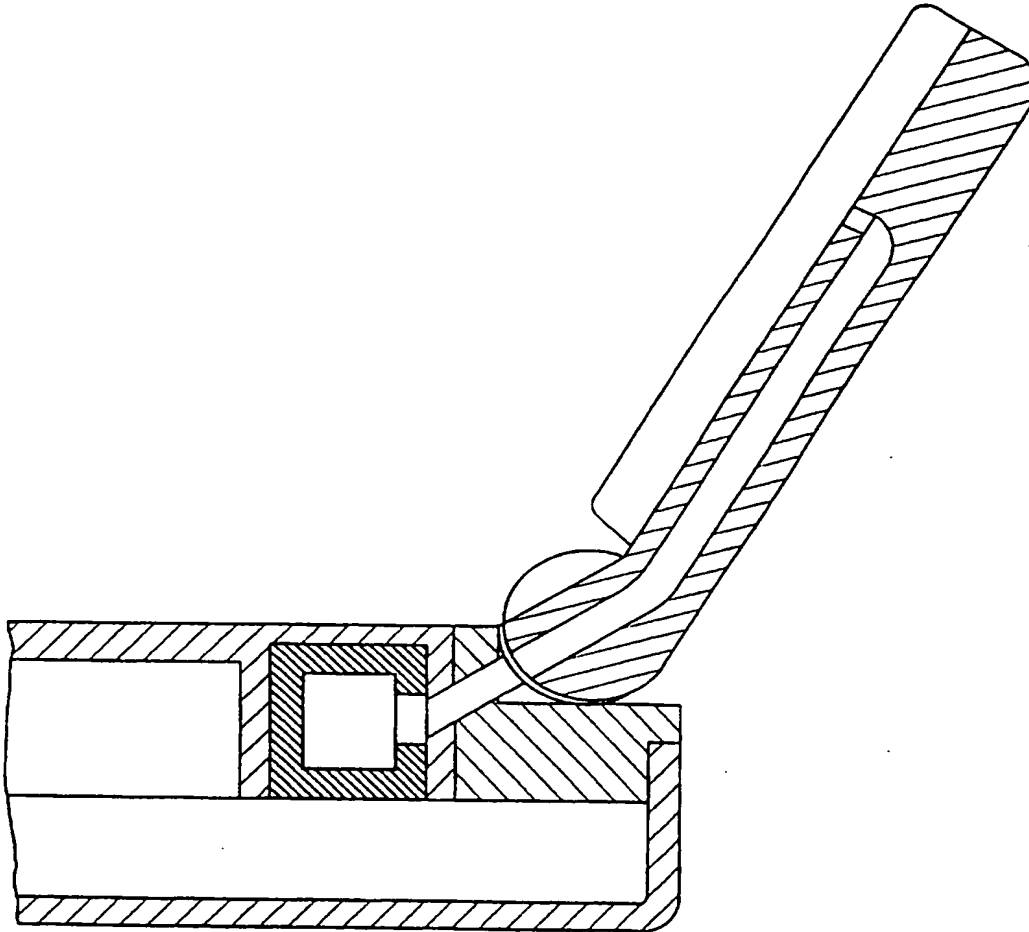


Fig. 1

SUBSTITUTE SHEET

2/2

Fig. 2

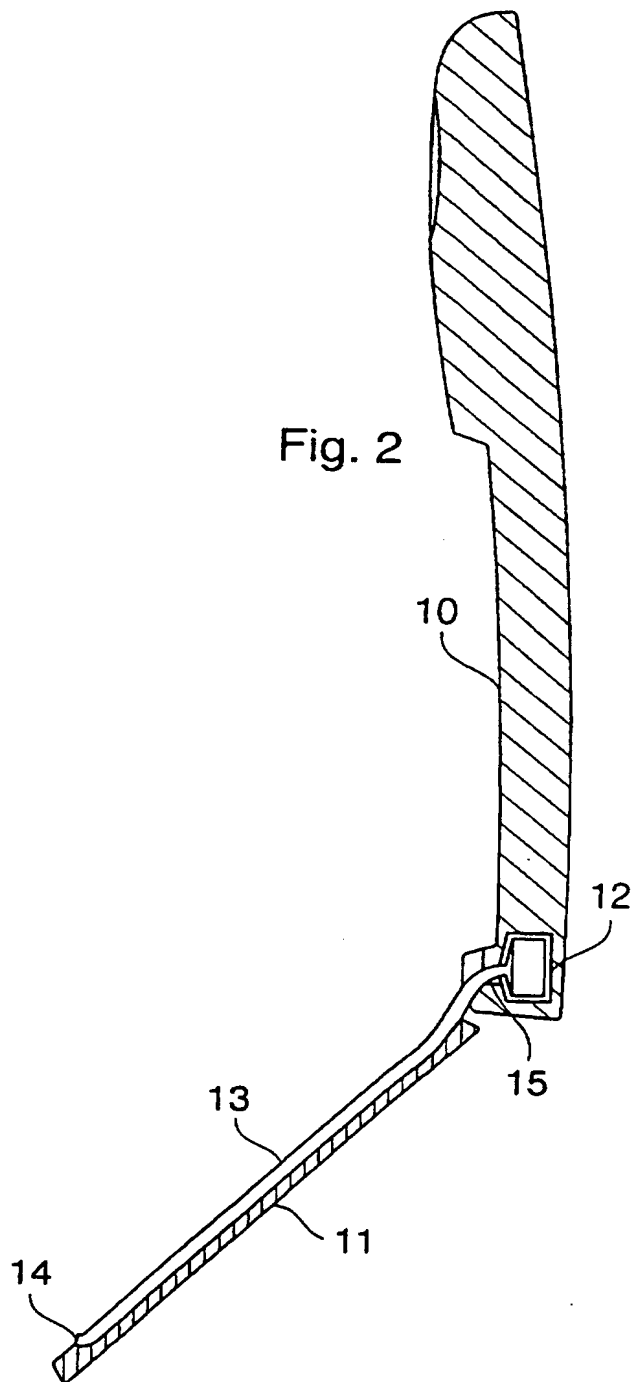
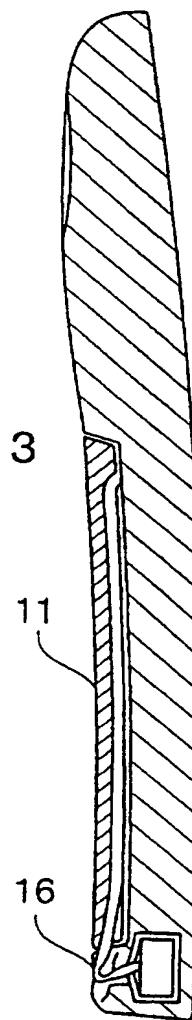


Fig. 3



SUBSTITUTE SHEET

1
INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 97/00623

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H04M 1/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0275996 A2 (SIEMENS AKTIENGESSELLSCHAFT BERLIN UND MÜNCHEN), 27 July 1988 (27.07.88), column 1, line 38 - column 2, line 27, figures 1-3 --	1-7
Y	US 5197091 A (TAKAGI ET AL), 23 March 1993 (23.03.93), column 4, line 1 - line 15; column 5, line 43 - line 45, figures 4a-7b --	1-7
Y	GB 2292650 A (VIKTOR JOHN LAWTON), 28 February 1996 (28.02.96), page 10, line 10 - page 12, line 14, figures 1-9B, abstract -----	1-7

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

& document member of the same patent family

Date of the actual completion of the international search

25 June 1997

Date of mailing of the international search report

07 -08- 1997

Name and mailing address of the ISA/
Swedish Patent Office
Box 5055, S-102 42 STOCKHOLM
Facsimile No. +46 8 666 02 86

Authorized officer

Roland Landström
Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT
Information on patent family members

03/06/97

International application No.
PCT/SE 97/00623

Patent document cited in search report			Publication date	Patent family member(s)			Publication date
EP	0275996	A2	27/07/88	DE	3882721	A	09/09/93
US	5197091	A	23/03/93	JP	3160851	A	10/07/91
GB	2292650	A	28/02/96	AU	2414595	A	05/12/95
				GB	9501054	D	00/00/00
				GB	9513792	D	00/00/00
				GB	9413561	D	00/00/00